

phosphazenes with polyamide resins. Such problems include substantial bleedout of the phosphazene from the resin composition, substantial deposits of phosphazene on the molds used to form the polyamide resin products, and phosphazene corrosion of molding machines.

To achieve the above object, the present invention is a flame retardant resin composition comprising:

100 parts by weight of a thermoplastic polyamide resin (A);  
1 to 100 parts by weight of a phosphazene compound (C); and,  
a polyphenylene ether-based resin, a polystyrene-based resin, or mixture thereof (B) being present in an amount of about 10 to about 500% by weight based on the weight of said phosphazene compound (C).

Because phosphazene compounds can have poor compatibility with aliphatic polyamide resins, phosphazene compounds may suffer from remarkable bleed-out. In the present invention, by blending polyphenylene ether-based resin, a polystyrene-based resin or mixture thereof, the compatibility between the polyamide and phosphazene compound can be improved, and therefore, the problems such as corrosion of molding machines due to the flame retardant composition, bleed-out and mold deposits thereof can be solved.

The advantages of the present invention are demonstrated for example in Example 1 and in Comparative Examples 2 and 6 of the application as filed. (See page 27, lines 22 to page 37, line 23) The results of the studies carried out in those examples show that by blending either a polyphenylene ether-based resin, a polystyrene-based resin, or both, into polyamide resin composition, the compatibility between the polyamide and phosphazene compound was improved and both bleed-out of the phosphazene compound did not occur, and mold deposits were not formed. On the other hand, in Comparative Example 2, where the phosphazene compound and polyamide resin were compounded without the polyphenylene ester-based resin or the

polystyrene-based resin, bleedout occurred, and considerable deposits and stickiness were observed on the mold and on the test specimens produced for mechanical evaluation. The same is also true for Comparative Example 6 of the application as filed. There, polybutylene terephthalate (PBT) was blended with the polyamide resin instead of PPE, and the compatibility of the composition was not improved.

The NAACO reference discloses a fire retardant resin composition made from a flame retardant of a phosphazene compound and a thermoplastic resin or a thermosetting resin. At page 10, paragraph [0075], an assortment of resins known in the art are listed as thermoplastic resins that may be used in the NAACO composition.

NAACO neither discloses the present problem of the incompatibility of phosphazene with polyamides, nor proposes any solution to the problem. NAACO did not describe or suggest the production of a polyamide resin composition comprising a thermoplastic polyamide resin, a phosphazene compound, and either a polyphenylene ether-based resin or a polystyrene-based resin or both. Further, NAACO neither describes nor suggests that by blending a polyphenylene ether-based resin and/or a polystyrene-based resin into a polyamide resin composition containing a phosphazene compound, the technical advantage of preventing the bleeding-out of the phosphazene compound can be attained.

The Office Action states, "(v)arious thermoplastic resins are used, some of them being a polyamide, modified polyphenylene ether, styrene resin and modified styrene resins (page 10, lines 7-18)." While NAACO contains some tremendously broad statements about as many thermoplastic resins and thermosetting resins as could be listed, NAACO actually disclosed only one composition which utilized a polyamide resin in combination with a phosphazene, namely Example 56, described in paragraph [0255] on page 28. That composition contained only Nylon 6 and the phosphazene. It did not evaluate bleedout or mold deposits or molding machine corrosion. NAACO never addressed the problem which is resolved in accordance with the present

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invention, namely, the incompatibility of phosphazene with amide type resins, which causes severe bleedout of the phosphazene material.

NAACO attempted to preempt the field, but failed to address or resolve the serious problem with phosphazene inhibitors. NAACO provided no motivation to select and combine any of polyamide, modified polyphenylene ether, styrene resin, and modified styrene resins to achieve the instantly claimed composition. Further, as mentioned above, in Comparative Example 6 of the present specification, PBT, which is listed in NAACO as a thermoplastic resin, was blended instead of PPE as in the instantly claimed composition, the bleed-out of the flame retarder and mold deposits were observed. Thus, the compatibility of the flame retardant composition containing PBT was not improved thereby.

Thus, the claims of the present invention are not anticipated or obvious over NAACO. Applicants respectfully request reconsideration and withdrawal of the rejection.

Claims 1-13 are rejected under 35 U.S.C. §103(a) as obvious over NAACO, *et al.* (EP 0945478) in view of Ida, *et al.* (U.S. Patent No. 6,337,031, "Ida") or An, *et al.* (U.S. Patent 5,028,347, "An").

Applicants respectfully traverse this rejection. The cited references do not teach the presently claimed flame-retardant composition. As claimed, the invention is a flame retardant resin composition comprising:

100 parts by weight of a thermoplastic polyamide resin (A);  
1 to 100 parts by weight of a phosphazene compound (C); and,  
a polyphenylene ether-based resin, a polystyrene-based resin or mixture thereof (B) being present in an amount of about 10 to about 500% by weight based on the weight of said phosphazene compound (C).

NAACO has been discussed above and those comments are incorporated herein by reference. Further, while NAACO suggests other additives that may be added to the flame retardant composition (see page 10, line 37 to page 12, line 49), the reference does not hint that magnetic particles could be desirably added to the composition to give it a magnetic quality.

Ida does not make up for the deficiencies in the disclosure of NAACO. The Ida reference discloses flame retardant resin magnet material obtained by adding an alnico-based magnetic powder or a ferrite-based magnetic powder to a flame-retardant resin composition of heat-resistant aluminum hydroxide, antimony trioxide, and polyamide resin. See, e.g., Col. 2, line 64 to Col. 3, line 9. Ida does not disclose any other resin compositions that may be included with the polyamide resin. There is no suggestion that Ida's flame retardant materials are incompatible with polyamides, or what one would do to overcome that problem if it were to arise. Ida also does not disclose or suggest using a phosphazine flame retardant compound as a flame retardant, or any way of enhancing flame retardant compositions containing phosphazine flame retardants.

The An reference also does not make up for the deficiencies in the disclosure of NAACO. An discloses a flame retardant magnetic composite resin composition composed of 10 to 50% by weight of a binder resin mixture containing 100 parts by weight of a polyamide resin, with the remainder made up of various organic and inorganic additive compounds, including non-phosphazine flame retardants, and 50 to 90% by weight of magnetic powder. The reference does not disclose any other resin compositions that may be included with the polyamide resin. An also fails to disclose or suggest the phosphazene flame retardant compound as a flame-retardant because An specifies a different flame retardant compound for use in the flame retardant magnetic resin composition. Thus the reference clearly does not suggest the addition of the resins of the present claims for improving the compatibility of phosphazine compounds with polyamides.

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Thus, the claims of the present invention would not have been obvious over NAACO in view of either An or Ida. Thus, all the claims are allowable over these references. Applicants respectfully request reconsideration and withdrawal of the rejection.

In view of the above discussion, it is respectfully submitted that the present application is in condition for allowance. Therefore, an early reconsideration and allowance are respectfully requested.

Should the Examiner wish to discuss any of the amendments and/or remarks made herein, the undersigned attorney would appreciate the opportunity to do so.

Respectfully submitted,

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